

4.179

Report on Disposal of Solid Toxic
Wastes Residues and Trash, 11-8-
57

EIC 5033

REPORT ON DISPOSAL OF
SOLID TOXIC WASTES, RESIDUES
AND TRASH FROM
J. F. QUEENY & W. G. KRUMMRICH PLANT

REPORT NO. 80

C. N. Stutz

Organic Division

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(ENVIRONMENTAL INSURANCE
LITIGATION MATERIALS)**

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REPORT ON DISPOSAL OF
SOLID TOXIC WASTES, RESIDUES
AND TRASH
FROM
J. F. QUEENY & W. G. KRUMMRICH PLANT

REPORT NO. 80

EA #749.10-4-179

Monsanto Chemical Company
Organic Division
Engineering Department

Report By:
C. N. Stutz
Sanitary Engineer
Organic Division

Approved By:
F. J. Holzapfel
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Date: November 8, 1957

MCO 8032658

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DISPOSAL OF SOLID TOXIC WASTES,
RESIDUES AND TRASH
FROM THE
J. F. QUEENY AND W. G. KRUMMRICH PLANTS

INTRODUCTION

The disposal of toxic residues, waste chemicals, trash and refuse from the Queeny and Krummrich Plants has been a problem for a number of years. In 1950 and 1953, an investigation was made on the possibilities of disposing of the combustible liquid and solid residues by incineration. Visits were made to several such installations, costs were investigated and burning tests made. It was concluded at that time that dumping would be the most economical method of disposal. Arrangements were made with Mr. Leo Sauget of Monsanto Village to dump in an excavated area adjacent to the Krummrich Plant and owned by Mr. Sauget. In July of this year, Mr. Sauget notified the Krummrich Plant that he does not intend to extend the dump contract beyond the expiration date of December 30, 1957. This action was prompted by an odor nuisance which developed and also because the excavated area owned by Mr. Sauget is practically all filled.

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An engineering request dated July 25, 1957 and designated as Job #749.10-4-179 initiated the present study on the solid waste disposal for the plants. This study included a review of previous reports, the gathering of data on the quantity and characteristics of the waste to be disposed of and the investigation of the various means available at this time for disposal.

From the study it is concluded:

- (1) The most satisfactory and economical means of solid waste disposal for the Queeny Plant and Krummrich Plant at this time would be by the Sanitary Land Fill method combined with a trash incinerator. A site adjacent to the river dock is presently under consideration for purchase, and a portion of this tract located east of the Pitzman Levee would probably make a satisfactory disposal area.
- (2) Incineration of combustible liquid and solid residues does not appear to be economically justified at this time.
- (3) The operation of a Sanitary Land Fill operation should be controlled by the company so as to reduce hazards from fires, odors, and possible injury to operators. The scavenging of the dump should be prohibited or strictly controlled.

It is therefore recommended that the following action be taken:

- (1) Establish a toxic dump at or near site #1 and operate as a Sanitary Land Fill by contract or with company owned equipment and employees.
- (2) Construct a trash incinerator so as to reduce the amount of land required for dumping purposes and possibly also the hauling costs.

PRESENT METHOD OF DISPOSAL

QUEENY PLANT

The materials going to the toxic dump at the present time from the Queeny Plant consists of toxic residues, waste chemicals, paper sacks, cardboard, cartons, metal cans, fiber packs, waste paper, floor sweepings, garbage, scrap building materials, etc. The quantity of these materials are shown on Exhibit No. 1.

The toxic residues are placed in closed steel drums. These drums are picked up by a fork truck and taken to a storage platform. The waste paper, cartons, etc. are placed in metal drums which are in turn emptied into tractor train cars and hauled to a loading platform in the plant. Papers from the offices are placed in large paper sacks and burned in the plant incinerator. Private trucks which are hired on a load basis haul the residues and other waste materials to the Sauget Dump near to the Krummrich Plant for disposal. The reported cost of this operation for 1956 is as follows:

Sauget Dump Rental	\$2,000 per year
Pickup, Sorting & Burning	70,466 per year
Contract Hauling	<u>27,400 per year</u>
TOTAL	\$99,866 per year

In addition to the above, some toxic residues are being drained into the plant sewers. These wastes should be collected and disposed of in a more suitable manner. We have considered their disposal in this study along with the other wastes.

PROTECTED MATERIAL: MONSANTO INSURANCE COVERAGE LITIGATION

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The burning of waste paper in the incinerator at the plant quite often produces a smoke nuisance and brings a penalty fine from the city smoke inspector. The incinerator is small in capacity and in poor state of repair.

EXHIBIT NO. 1
TOXIC WASTE DISPOSAL - KRUMMRICH AND QUEENY PLANTS

Queeney Plant - Pounds/Month

Dept.	Liquids		Solids		Trash		Type
	Comb.	Non-Comb.	Comb.	Non-Comb.	Comb.	Non-Comb.	
1 B-1				1000			Filter Aid
Z-0			500				Tars
A-10			15,000				Tars
A-11			500				Tars
C-4			5,000				Tars
B,C,D-5			50,000				Tars
22	10,000						Fluid
32				1200			Tars
F-11			1,500				Tars
53			50,000				Tars
A-485			1,000				Tars
A-3-B-53			500				Acid
-A-485				1500			Filter Aid
4				10000			Filter Aid
5			2,000				Tars
C-1				4000			Lime
B-2			3,000				Tars
14			6,000				Tars
A-1					1,000		Filter Cartridges
35	40,000						Oil & Filter Aid
35				6000			Mud
44			5,000				Oil & Filter Aid
155	75,000						Toxic Liquid
155			7,000				Tars
A-9-L			200,000				Tars
A-9-0			42,000				Organic Residue
23	8,959						Toxic Liquid
D-25E-25		500					Tars
T.T.T.	5,000						Solvent
A-9XXX			12,000				Tars
Service					231,500		Paper, Rags, Rubber, Etc.
Service						800,000	Cinders and Con- crete
W.W.	1,500		400				Solvents
A-192	15,000						Toxic Liquid
54			1,200				Organic Sweepings
A-60			5,000				Organic Salts
NCB	1,250,000						Toxic Liquid
TOTAL	1,405,959		407,600	23,700	232,500	800,000	

MCO 8032663

KRUMMRICH PLANT

The materials going to the toxic dump consist of waste chemicals, residues, filter aid, waste paper, garbage, cardboard, fiber packs, steel drums, scrap building materials, etc. The quantities of these materials are shown on Exhibit No. 2.

All materials are placed in Dumpster buckets and hauled by company owned and operated trucks to the Sauget Dump. The reported costs of this operation for 1956 is as follows: -

Sauget Dump Rental	\$3,000 per year
Pickup and Hauling	<u>41,000 per year</u>
TOTAL	\$44,000 per year

In addition to the above materials, there are some waste chemicals which are being stored for fear of creating a nuisance when disposed of on an open dump and also some chemical residues which are being drained into the plant sewers. This report covers the disposal of these additional wastes.

SAUGET DUMP

This is a privately owned and operated dump and is located adjacent to the Krummrich Plant. The dump is operated as an open type dump with scavengers employed by the owner of the dump. The materials are deposited from the trucks into an excavated area and are scavenged for saleable materials such as cardboard, steel drums, metal parts, etc. The surface is kept leveled by hand using rakes and shovels. Fires are controlled by hose lines which are kept available at all times. The fee for the use of the dump is \$2,000 per year by the Queeny Plant and \$3,000 per year by the Krummrich Plant. The dump is also used by other industrial concerns.

PROTECTED MATERIAL: MONSANTO INSURANCE COVERAGE LITIGATION

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EXHIBIT NO. 2

TOXIC WASTE DISPOSAL - KRUMMRICH & QUEENY PLANTS

Krummrich Plant Cu. yd./day

Dept.	<u>Liquids-gal./day</u>		<u>Solids</u>		<u>Trash</u>		<u>Type</u>
	Comb.	Non-Comb.	Comb.	Non-Comb.	Comb.	Non-Comb.	
245					1.4		Trash
248			1.4				Filter Aid
242					0.7		Bags
243					10		Wood & Bags
244			1.0				Waste Products
217			5.0		1.4		Trash & Filter
							Cake
412			2.5		0.5	2.0	Filter Aid
							Drums & Bags
B-215			5.0				Filter Aid
257			10		5-		Filter Aid &
							Trash
250			0.1		10		Papers and
							Scrappings
223					5		Papers, sacks
A-223			0.1		10		Chemical Rubbish
F-223	16		3.5		2		Liquid Residue
							Solid Residue
247			0.7		1.0	0.2	Residues-Drums
237			0.2		0.1		Filter Aid Bags
226					5		Bags, Fiber
							Board
254			1.2		5		Residues, Trash
232			10.5				Calcium Sulphate
							Graphite
230			2.5		2.5		Graphite, Wood
234						3.5	Cement
A-233			5.0				Residue
233			0.2		7.5		Residue, Sacks
238			0.6		2.0		Wood, Bags,
							Residue
258			8.0			2.2	Filter Cake Cans
C-258			12.5		2.5	10	Filter Cake
							Cans, Trash
266			0.8		10	5.0	Filter Cake
							Cans, Bags
A-221			0.01		2		Residue, Trash
O-222			0.17		16.4		Residue, Bags
Service			0.17		10		Garbage
Shop-Storeroom					45		Trash
Benzene,							
etc.	1725						
Phenol			0.2				Solid
Phenol-Residue			3.0				Residue
Benzyl Chloride			1.2				
Oil Sludge			2.4				Sludge
I e Filter Aid			2.0				
TOTAL	1741 gal./day		79.78		155	22.9	

NEED FOR CHANGE

Early this past summer, the Krummrich Plant was notified by Mr. Sauget that the dump would soon be closed to their use. This action was brought about because an odor nuisance of hydrogen sulfide emanated from the dump after some waste P_2S_5 was placed on the dump. The disposal of this material was discontinued as soon as the nuisance developed. But this incident pointed up the need for a more suitable method for the disposal of all the waste materials produced at the plants.

Inspection of the Sauget dump indicated that the excavated area which is being used for the dump is rapidly being filled. At the present rate of use, it will be entirely filled within the next 6-8 months. Another place will therefore need to be secured within the next few months for the disposal of wastes from the Queeny and Krummrich Plants.

ALTERNATE METHOD OF DISPOSAL

We have considered the following methods of disposal and have estimated the approximate cost of each method. The costs are in addition to the present cost of collection and hauling to the Sauget Dump.

- (1) Disposal on a privately owned and operated dump, similar to the present arrangement with Mr. Sauget.
- (2) Incineration of toxic liquids and residues.
- (3) Incineration of combustible trash and rubbish.
- (4) Disposal on company owned and operated dump.
- (5) Combinations of the above.

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PRIVATELY OWNED AND OPERATED DUMPS

Two privately owned and operated dumps were investigated which appeared to have sufficient area for the needs of the Queeny and Krummrich Plants. These dumps were located near the Mississippi River and approximately two miles from the Krummrich Plant. One dump is on railroad property north of the Krummrich Plant and directly south of the McArthur Bridge. There is approximately 100 acres available at this site. The dump is presently being used by the public on a fee basis, and is of the open type, scavenged and kept burning.

The second dump is located about 2½ miles south of the Krummrich Plant and directly east of the Levee. The dump is on Pitzman Property and is leased for dumping purposes. This dump is also open to the public on a fee basis and is of the open type, scavenged and kept burning. Both of these dumps would have to be changed in their type of operation if used by Monsanto. The dump would need to be closed to the public, kept free from fires, and preferably not scavenged.

Both operators have been contacted by Mr. R. W. Sprandel of the Krummrich Plant and indicated their interest in taking our wastes, but would not close the dumps to public use. The use of a dump which is open to the public would not be suitable for the disposal of toxic wastes. The chance of injury from mishandling is great and would produce liabilities far in excess of any apparent savings. There may be some possibility of obtaining a private contractor to operate a dump on Monsanto leasing or owned land under the direct supervision of the company. This proposition has not been investigated, but perhaps could be arranged for after a specific site is

PRIVATELY OWNED AND OPERATED DUMPS (Contd.)

selected. The basis for payment could be negotiated on the basis of the estimated cost of operating a dump by our company.

INCINERATION OF TOXIC WASTES AND RESIDUES

Between 1950 and 1952 a study was made by personnel of the Queeny Plant and Krummrich Plant on the possibility of burning toxic wastes and residues. The incinerator in the north area at the Krummrich Plant was used for testing the burning characteristics of the various residues produced at that time. With few exceptions all the residues were successfully burned. A statement to this affect taken from the report and designated as Exhibit No. 3 is attached.

Preliminary drawings were prepared at that time for an incinerator which would be located at the Krummrich Plant. The incinerator was designed to burn 360 gallons per hour of liquid residues and an undetermined amount of solid residues. We have reviewed these plans and believe that they are suitable to use at this time for estimating purposes. Attached is an estimate of the cost of constructing and operating this particular incinerator and labeled Exhibit 4. The estimated cost per cubic yard of materials burned is \$3.65.

Incineration provides a sure and complete means for the disposal of combustible toxic wastes. The type of waste to be handled, however, varies considerably in character and creates a number of difficulties in handling. The melting points, viscosity, heat values

INCINERATION OF TOXIC WASTES AND RESIDUES (Contd.)

all vary, hence, provisions have to be made for heating, mixing and blending before burning. A scrubber is included in the estimate because of the anticipated problems of air pollution.

EXHIBIT NO. 3

REPORT ON WASTE DISPOSAL

BY INCINERATION FOR QUEENY AND KRUMMRICH PLANTS

Dated: August 3, 1953

Prepared By: R. E. Trampe

Tests By: J. R. Donovan

The results of the pilot plant incinerator studies show that it would be possible to dispose of a large number of the flammable wastes from the Krummrach and Queeny Plants by incineration. If a material, either by itself or in a mixture with auxiliary fuel, will burn and can be pumped at a reasonable temperature, it can be disposed of by incineration. Some of the materials tried at the incinerator were easily pumped and burned quite well as received. Others required special treatment (See Section VI, "Discussions"). With suitable facilities for blending auxiliary fuel with difficult combustible materials, it would be possible to burn most of the materials being considered for incineration.

Bubbler samples indicated the presence of atmospheric pollutants such as HCl, sodium salts, and SO₃ in the stack gases from the incinerator. Some of the wastes also evolved considerable smoke. Suitable stack gas scrubbing facilities would undoubtedly be required to prevent atmospheric pollution.

EXHIBIT NO. 4

COST OF LIQUID AND CHEMICAL SOLIDS INCINERATION

Assume 10,000 gal./day liquids or 50 cu. yds. and
 8 cu. yds. solids/day
 Total = 58 cu. yds/day

Assume cost of Incinerator = \$200,000

Assume life = 10 years or \$20,000 per year

— Assume maintenance = 5% per year = — \$10,000 per year

Assume Aux. Fuel = 1000 cu. ft./hr. @41¢/1000
= .41 x 24 x 365 = \$ 3,580 per year

Assume labor required = 6 men @ \$140 per week each
 = 6 x 52 x 140 \$43,680 per year

Total Cost = \$77,260 per year

$$\text{Cost per cu. yd.} = \frac{77,260}{21,200} = \$3.65 \text{ per cu. yd.}$$

Use - \$3.65 per cu. yd.

INCINERATION OF COMBUSTIBLE TRASH AND RUBBISH

The quantity of trash and rubbish at the present time is estimated at 170 cubic yards per day. It consists of paper, cardboard, crating, fiber packs, paper, sacks, etc. The material is bulky and adds considerably to the cost of hauling. Incineration offers a desirable means for the disposal of this material if properly handled so as not to create a smoke problem. An estimate has been prepared on providing a trash burner of the Wilco Type similar to the one recently purchased at Nitro. The capacity however, will be 25-30 cubic yards per hour. It is reported that if properly operated these burners can burn trash, without creating a smoke nuisance. The location of the burner is assumed as being on the west side of Rt. 3, on company property, adjacent to the Krummrich Plant. The estimated cost of incineration including amortization, maintenance and operation is 31¢ per cubic yard. Attached is a copy of the estimate labeled Exhibit No. 5. This cost is approximately the same as the cost of operating a sanitary land fill type of dump. If the cost of land or the cost of hauling becomes an important item, then a trash incinerator would be the most economical means of disposing of combustible trash and rubbish.

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EXHIBIT NO. 5

COST OF TRASH INCINERATION

Assume 175 cu. yds. per day = $175 \times 365 = 64,000$ cu. yds. per year.

Assume Cost of Trash Burner = \$50,000

Assume Life of Burner = 10 years. Cost per year = 5,000

Assume 2 men required to operate Burner @ rate of
\$140 per week each

Assume labor cost = $52 \times 80 =$ \$14,560 per year

Assume Air Blower with 15 H.P. motor

Cost of operation 8 hrs/day power @ 1¢ per KWH =

$8 \times 15 \times .75 \times \frac{1}{100} = 90¢$ per day or $.90 \times 5 \times 52 = \$ 234$ per year

Total Cost per year = \$19,794

Cost per cu. yd. = $\frac{19,794}{64,000} = \$.308$ Use - 31¢ per cu. yd.

COMPANY OWNED AND OPERATED DUMP

A survey was made of the area in the vicinity of the Krummrich Plant for suitable dump sites. Five such sites were located and are shown on the attached map. Estimates have been prepared for the extra costs of hauling from the Krummrich Plant to the various dump sites. These costs are as follows:

- Site 1 - Extra cost of hauling from Krummrich Plant - none
- Site 2 - Extra cost of hauling from Krummrich Plant - \$0.30 per cubic yard
- Site 3 - Extra Cost of hauling from Krummrich Plant - \$1.00 per cubic yard
- Site 4 & 5 - Extra cost of hauling from Krummrich Plant - \$1.25 per cubic yard.

Sites 1 and 2 which are located near the river have the advantage of a short haul from the Krummrich Plant. They are in areas which would be improved by filling. The soil conditions are assumed to be similar to that at the River Raney Well, where a 30' thick clay layer protects the underlying water supply. A typical log of the ground formation at this location is attached.

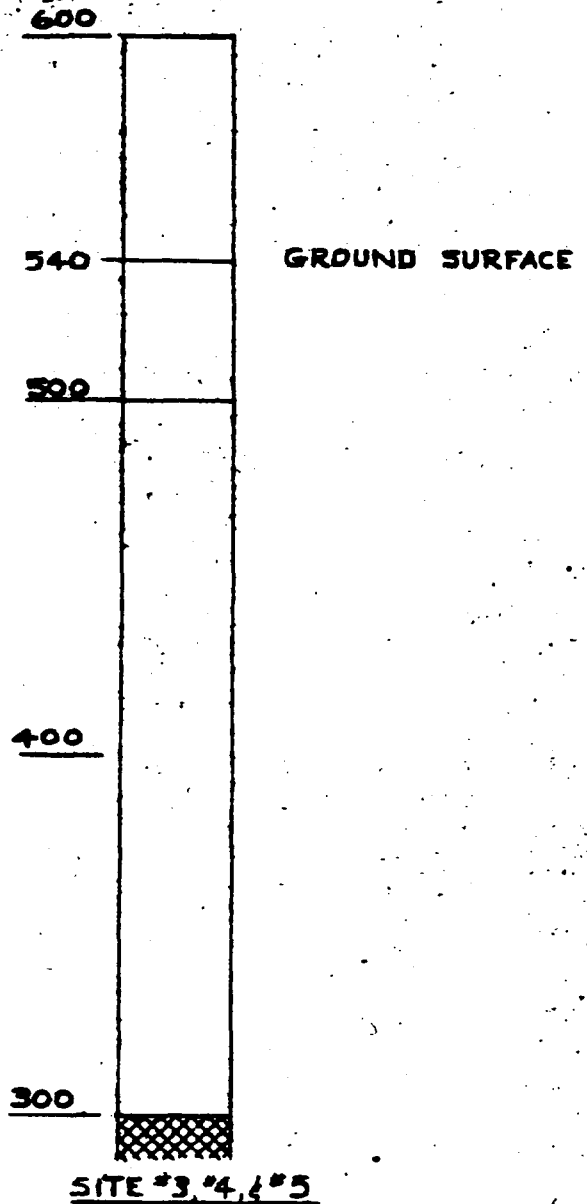
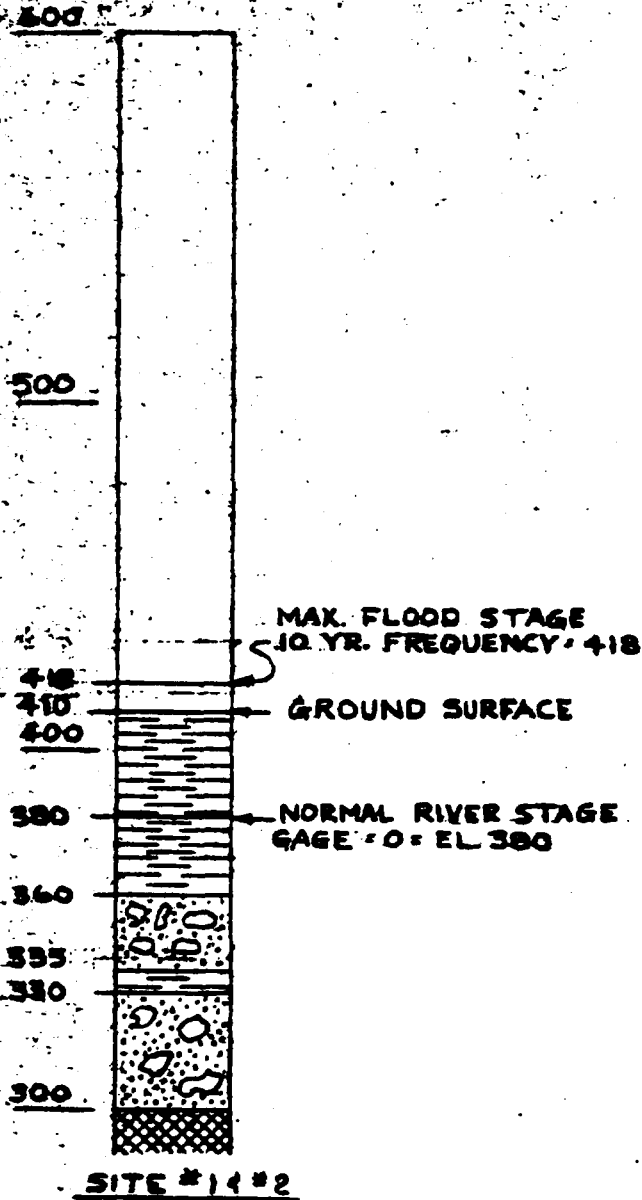
The sites are protected by a low levee which will protect the dumping operations from flooding most of the time. The top of the levee is reported to be at elevation 422. A record of the flood frequency is attached and labeled Exhibit 6. The dump sites are well removed from the bank of the river. This gives protection against rapid seepage into the river. A tract of land adjacent to Site 1 is under consideration at the present time for purchase by our company.

A portion of this site could perhaps be used to advantage as a dump area. Sites 3, 4, and 5 are in abandoned strip mine areas. The sub-soil appears tight which should protect underlying strata from contamination. The topography is relatively flat so run off from the dump area into surface streams will not be a problem. The areas are also removed from known well water supplies.

The advantage of sites 1 and 2 over 3, 4 and 5 is the shorter hauling distance. Hauling is a considerable item in the cost of disposal. The disadvantage is the possible pollution of underground water. The Krummrich Plant River Ranney Well is the only known supply from this source at the present time. Since this water is not used for drinking purposes, a slight amount of contamination could perhaps be permitted. However, if site 1 is selected, or a site near site 1, a close check should be maintained on the chemical composition of the water from the River Ranney Well to see if seepage from the dump is reaching the water supply. Soil tests should be made on the site selected to determine the protection available to the underground water strata.

The rate of decomposition of toxic wastes in a dump is not known. It is assumed that they will eventually decompose and become inert since they are all non stable substances.

Estimates have been prepared on the cost of operating a dump area using company owned equipment and labor. These costs are based on operating the dump as a Sanitary Land Fill dump so as to reduce the hazards from fires, odors, and personal contact with the toxic materials. The estimated cost of operating a dump exclusive of the cost of land is \$0.28 per cubic yard. The calculations used in arriving at this cost are attached and labeled Exhibit No. 7.



LEGEND



SILT



SAND &
GRAVEL



CLAY



SANDY
CLAY



SAND



ROCK

SOIL LOGS AT PROPOSED
TOXIC WASTE DUMP SITES
FOR
QUEENY & KRUMMRICH PLANTS
MONSANTO CHEMICAL COMPANY
ORGANIC CHEMICAL DIVISION
ENGR. DEPT. ST. LOUIS

SEPT 1957

EXHIBIT NO. 6

TOXIC WASTE DISPOSAL QUEENY & KRUMMRICH PLANTS

Flood Stage Frequency on Mississippi River

<u>Frequency</u>	<u>Elevation of Flood Crest Above Sea Level</u>
1 year	408.0
1.5 years	411.5
2 years	413.5
3 years	414.75
4 years	415.5
5 years	416
6 years	416.25
7 years	416.75
8 years	417.0
9 years	417.25
10 years	417.5

Elevation top of Pitzman Dyke	= 422
Elevation top of proposed government levee	= 452
Elevation ground surface site No. 1	= 410
Elevation ground surface site No. 2	= 405
Elevation top of proposed fill both sites	= 420

EXHIBIT NO. 7

TOXIC WASTE DISPOSAL KRUMMRICH & QUEENY PLANTS

Cost of Sanitary Land Fill Operation

Assume 100,000 cu. yds. material per year.

Assume trench excavation = $1/2$ total volume or 50,000 cu. yds./yr.

Assume Cost of excavation = 30¢ per cu. yd. or $.30 \times 50,000 = \$15,000/\text{yr.}$

Cost of Traxcavator = \$24,000

Assume Life = 5 years Cost per year = $\frac{24,000}{5} = \$4,800$ per year

Assume one operator @ \$28.00 per day 5 days per week, 52 weeks per year.

Cost of operator per year = $28 \times 5 \times 52 = \7280 per year.

Total cost per year = 27,080 per year

Cost per cu. yd. = $\frac{27,080}{100,000} = \0.271 per cu. yd.

Use 28¢ per cu. yd.

COMBINATION METHODS

Estimates have been prepared on the following combination of methods.

- (1) Incineration of chemical residues plus land fill.
- (2) Incineration of trash plus land fill.
- (3) Incineration of chemical residues and trash plus land fill.

The summary of the yearly costs of these various methods is as follows:

Summary of Yearly Costs for Different Methods of Disposal
Exclusive of the Cost of Land and in addition to
present costs of collection and hauling

<u>Type of Operation</u>	<u>Site 1</u>	<u>Site 2</u>	<u>Site 3</u>	<u>Site 4 and 5</u>
Land Fill only	\$35,000	\$72,000	\$160,000	\$191,000
Trash Incineration and Land Fill	36,800	55,600	99,600	115,200
Chemical Residue Incineration and Land Fill	102,500	133,900	207,200	233,200
Chemical Residue & Trash Inc. and Land Fill	104,350	117,150	147,000	157,700

These costs are in addition to the present collection and hauling costs.

CONCLUSIONS

- 1) It would appear that the most satisfactory and economical means of solid waste disposal for the Queeny Plant and Krummrich Plant at this time would be by the Sanitary Land Fill method combined with a trash incinerator. A site adjacent to the river dock is presently under consideration for purchase, and a portion of this tract located east of the Pitzman Levee would probably make a satisfactory disposal area.
- 2) Incineration of combustible liquid and solid residues does not appear to be economically justified at this time.
- 3) The operation of a Sanitary Land Fill operation should be controlled by the company so as to reduce hazards from fires, odors, and possible injury to operators. The scavenging of the dump should be prohibited or strictly controlled.

RECOMMENDATIONS

- 1) Establish a toxic dump at or near Site #1 and operate as a Sanitary Land Fill by contract or with company owned equipment and employees.
- 2) Consideration should be given to constructing a trash incinerator so as to reduce the amount of land required and possibly also the hauling costs.

The basis of design is shown on Exhibit No. 8.


C. N. Stutz

EXHIBIT NO. 8

TOXIC WASTE DISPOSAL KRUMMRICH & QUEENY PLANTS

SUMMARY

Liquids Combustible

Queeney Plant	$\frac{1,405,959 \text{ \#/mo.}}{6} = \frac{234,500 \text{ gal/mo.}}{30} =$	7800 gal/day
Krummrich Plant		<u>1741</u> gal/day
Total		9541 gal/day

Chemical Solids - Combustible

Queeney Plant	$\frac{407,600 \text{ \#/mo.}}{60} = \frac{6,800 \text{ cu. ft./mo.}}{30 \times 27} =$	8.4 cu. yd./day
Krummrich Plant		<u>0</u>
Total		8.4 cu. yd/day

Chemical Solids - Non-Combustible

Queeney Plant	$\frac{23,700 \text{ \#/mo.}}{60} = \frac{396 \text{ cu. ft./mo.}}{30 \times 27} =$	0.5 cu. yd/day
Krummrich Plant		<u>80.0</u> cu. yd/day
Total		80.5 cu. yd/day

Trash - Combustible

Queeney Plant	$\frac{232,500 \text{ lbs/mo.}}{500} = \frac{465 \text{ cu. yd/mo.}}{30} =$	15.5 cu. yd/day
Krummrich Plant		<u>155</u> cu. yd/day
Total		170.5 cu. yd/day

Trash - Non-Combustible

Queeney Plant	$\frac{800,000 \text{ \#/mo.}}{2000} = \frac{400 \text{ cu. yd./mo.}}{30} =$	13 cu. yd./day
Krummrich Plant		<u>22.9</u> cu. yd/day
Total		35.9 cu. yd/day

EXHIBIT NO. 8

TOXIC WASTE DISPOSAL - KRUMMRICH & QUEENY PLANTS (Contd.)

TOTALS

Combustible Liquids 9541 gal./day or 47 cu. yds./day

Combustible Chemical Solids 8 cu. yd./day

Combustible Trash 171 cu. yd./day

Non-combustible Chemical Solids 80 cu. yd./day

Non-combustible Trash 36 cu. yd./day

Total = 342 cu. yd./day

= 125,000 cu. yd./yr.

Use 125,000 cu. yd./yr.

EXHIBIT NO. 8

INCINERATOR DESIGN CAPACITY

Liquid Burner	10,000 gal./day	= 416 gal./hr.
Chemical Solids	8 cu. yds./day or $\frac{8}{.3}$	= 27 drums/day
Trash	200 cu. yds./day	

MATERIALS NOT SUITABLE FOR INCINERATOR - DUMP AREA REQUIRED

Chemical Solids	80 cu. yds./day
Non-Combustible Trash	<u>36</u> cu. yds./day
Total	116 cu. yds./day

Vol. per year = $116 \times 365 = 42,400$ cu. yds./yr.

= $42,400 \times 27 = 1,145,000$ cu. ft./yr.

= $\frac{1,145,000}{43,560} = 26$ acre ft./yr.

= $\frac{26}{10} = 2.6$ acres/yr.

Dump area required with incinerator for 10 years = 26 acres Use 26
acres

MATERIALS SUITABLE FOR INCINERATION - DUMP AREA REQUIRED

Liquids	47 cu. yds./day
Chemical Solids	8 cu. yds./day
Trash	<u>170</u> cu. yds./day
Total	225 cu. yds./day

= $225 \times 365 = 82,500$ cu. yds./yr.

= $82,500 \times 27 = 2,230,000$ cu. ft./yr.

= $\frac{2,230,000}{43,560} = 51$ acre ft./yr.

@ 10' / depth = $\frac{51}{10} = 5.1$ acres/yr.

For 10 yr. use 50 acres

Total area required for all wastes for 10 yrs. 76 acres